IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
	)	
Markus Schetelig, et al.	)	
	)	Group Art Unit: 2611
Serial No.: 09/981,795	)	
	)	Examiner: Puente Zheng, Eva Y.
Filed: October 19, 2001	)	
	)	Attorney Docket No: 006916.00007
For: Method and a Device for Controlling	)	
Data Extraction from a Data Stream	)	Confirmation No.: 6987
Containing at Least One Data Packet	)	

<u>BRIEF ON APPEAL</u>

Mail Stop: Appeal Brief-Patents
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. § 41.37, Appellants submit this Appeal Brief to the Board of Patent Appeals and Interferences in response to the Final Office Action mailed on November 14, 2007. A Notice of Appeal was timely filed on January 29, 2008. Please charge any necessary fees in connection with this Appeal Brief to Deposit Account No. 19-0733.

I. Real Parties in Interest

The real party in interest is NOKIA CORPORATION.

II. Related Appeals and Interferences

Appellants are unaware of any appeals or interferences related to the subject appeal.

III. Status of the Claims

Claims 12-28 are pending and are found in the Appendix. Claims 1-11 were canceled. Claims 12-19 and 22-26 stand rejected. Claims 20-21, 27, and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 12-19 and 22-26 are being appealed.

IV. Status of Amendments

No amendment after final rejection has been filed.

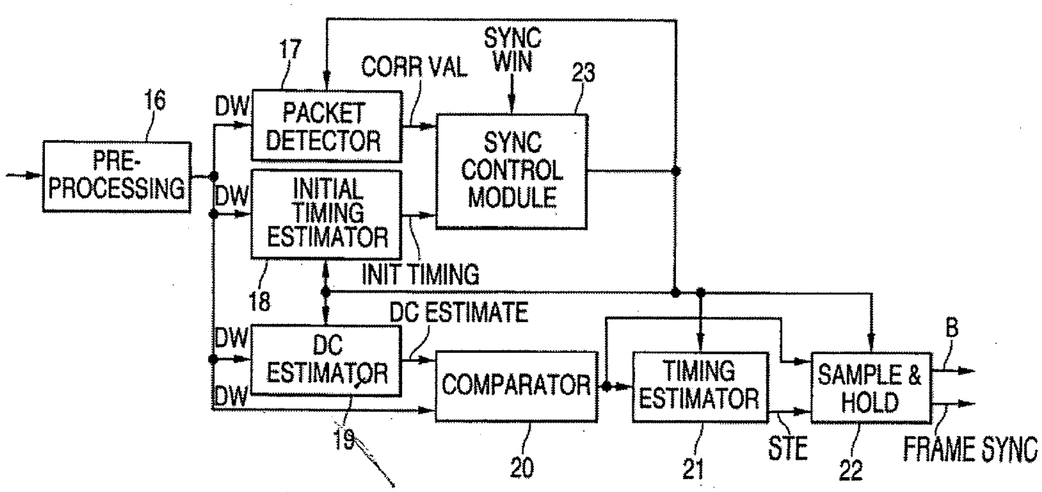
V. Summary of the Claimed Subject Matter

In the following discussion, references are shown in relation to the published patent application (200300769050).

The present invention is directed to methods and apparatuses for data extraction from a data stream containing at least one data packet. (Paragraph 1.) The methods and apparatuses may be used in a receiver of a wireless digital communication system. The following description summarizes the invention and is subsequently followed by the specific descriptions of the independent claims 12, 18, and 24 (labeled as "**Description of Independent Claims**").

As shown in Figure 3 below, the synchronization unit includes preprocessing module 16, packet detector 17, initial timing estimator 18, DC estimator 19, comparator 20, timing estimator 21, sample-and-hold module 22, and sync-control module 23 that controls all modules given above. (Paragraph 0036.)

FIG. 3



Preprocessing module 16 may contain ADC postprocessing or postdetection filtering of the demodulated signal. (Paragraph 0036.) Packet detector 17 scans the digital representation of the demodulated waveform for valid access codes, and initial timing estimator 18 provides an initial estimate of the symbol timing. DC estimator 19 generates initial as well as continuously tracked DC estimates for symbol slicing by comparator 20. Timing estimator 21 continuously tracks the symbol timing. Sample-and-hold module 22 performs the downsampling for symbol decision and provides an interface to circuits at a higher level for further processing the extracted data. (Paragraph 0045.)

Different phases are associated with synchronization process can be split into different phases and are represented by different states of the state machine inside the sync-control module 23. (Paragraphs 0048-0055.) The phases include:

- INIT: All modules are initialized to a well-defined startup state.
- SEARCH PACKET: A valid packet is searched.
- PACKET FOUND: A valid packet has been found.
- SEARCH TIMING: The accurate symbol timing is searched.
- SYNCFOUND: The symbol timing, i.e. synchronization, has been found.
- ACTIVE: Data extraction is running; however the search for valid packets is still continued.
- FINISHED: Data extraction is running until the synchronization unit is switched off, no packet search is done anymore.

During the INIT state, internal registers of the synchronization unit are reset to default or programmable values. (Paragraph 0056.) The state INIT is left and the state SEARCH PACKET is entered when the enable signal is set to high.

When entering the state SEARCH PACKET the packet detector 17 and initial timing estimator 18 are enabled. (Paragraph 0057.) Packet detector 17 delivers a correlation value CorrVal to the sync-control module 23, which indicates the degree of similarity between a bit stream of a received demodulated waveform and the expected access code or synchronization word. When CorrVal exceeds a programmable threshold CorrThres the wanted packet is determined as being found. In this case the state PACKET FOUND is entered in case that the signal SyncWin is high or 1.

When the state PACKET FOUND is entered. the latest correlation value CorrVal is stored in a register MaxCorrVal of the sync-control module 23. (Paragraph 0058.) Whenever a new correlation value CorrVal from the packet detector 17 exceeds the registered correlation value MaxCorrVal, the state PACKET FOUND is reentered and MaxCorrVal is set to the new value. (Paragraph 0059.) Consequently, the synchronization unit can continue with scanning for access codes while data extraction is already prepared or even started. In case the correlation value CorrVal indicates a higher level of confidence (higher correlation value CorrVal) compared to the last packet detection, the synchronization process is restarted and the extracted data received so far is rejected.

When the state PACKET FOUND is entered the timing of the detected packet is already roughly known within plus/minus 1 symbol. (Paragraph 0062.). Consequently, initial timing estimator 18 has to search for the accurate timing during one symbol period only. This allows an efficient implementation of the initial timing estimator 18. In the state SEARCH

TIMING the sync-control module 23 waits for the trigger signal InitTiming from the initial timing estimator 18. (Paragraph 0065.) The state SYNCFOUND only lasts for one clock cycle. (Paragraph 0066.) It indicates to the other modules that an access code with the accurate symbol timing has been found. Timing estimator 21 (as further discussed below) and the sample-and-hold module 22 are initialized during the state SYNCFOUND. In these modules 21 and 22 modulo counters with a period corresponding to the symbol period are started then. The state SYNCFOUND is immediately left. Normally the state ACTIVE is entered. During the state ACTIVE as well as during the state FINISHED the data extraction is active. (Paragraph 0068.)

Timing estimator 21 sets the sample time for the sample-and-hold circuit 22. (Paragraph 0073.) After initialization, timing estimator 21 continuously corrects the sampling time. Main reason for the continued correction is to compensate for initial timing errors after synchronization. A second reason is to compensate for deviations between the transmitter and receiver bit clock.

The timing estimation is done with an edge detection procedure. (Paragraph 0074.) Consequently, the edges of the oversampled data signal from symbol slicing are used to estimate the symbol timing. As the received and filtered symbols are symmetric the so called golden samples are found in the center of each symbol. Due to the symmetry of the symbols the edges are always positioned in the center between two symbols. Consequently the edges occur with a fixed phase of half a symbol relative to the golden samples.

The timing estimation is done in two steps. (Paragraph 0075.) In the first step for each edge on the data signal from symbol slicing, the estimated timing of an expected edge is compared with the actual edge timing. The estimated timing of an expected edge can be

generated by delaying the latest sampling trigger by half a symbol. The sampling triggers correspond to the estimated timing of the golden samples. The estimated timing of edges and the estimated timing of golden samples can be regarded as certain phases of the estimated symbol timing.

Description of Independent Claims

Independent claim 12 is directed to a method for data extraction. A bit stream from a received data stream is compared with an expected bit sequence to determine correlation value for detecting a data packet. (Paragraph 0057.) Data extraction from the bit stream is started when the correlation value exceeds a threshold value to indicate that a data packet has been detected. (Paragraph 0057.) When the correlation value (CorrVal) exceeds the threshold value, the correlation value is stored as the new threshold value (MaxCorrVal). (Paragraphs 0058-0059.) The bit stream is continued to be compared with the bit stream with the expected bit sequence to determine a new correlation value. (Paragraph 0059.) Data extraction from the bit stream is restarted when the new correlation value exceeds the stored maximum correlation value. (Paragraph 0059.)

Independent claim 18 is directed to apparatus for data extraction. The apparatus includes a data extraction unit that extracts data from a received data stream. (Paragraph 0036 and 0045.) Also, a packet detector compares a bit stream derived from the received digital data stream with an expected bit sequence to determine a correlation value for detecting a data packet. (Paragraph 0057.) The packet detector compares the received bit stream with the expected bit sequence after starting data extraction to determine a new correlation value. A sync-control module receives the correlation value from the packet detector, so that the sync-control module can control the data extraction unit for starting or

restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value. (Paragraphs 0058-0059.) When this occurs, a data packet has been detected. (Paragraph 0057.) When the correlation value exceeds the threshold value, the correlation value is stored as the maximum correlation value for use as a new threshold value. (Paragraphs 0058 and 0059.)

Independent claim 24 is directed to apparatus that includes a data extraction unit, a packet detector and a sync-control module. (Figure 3; Paragraph 0036.) The data extraction unit that extracts data from a received data stream. (Paragraph 0036 and 0045.) The packet detector is configured to compare a bit stream derived from the received digital data stream with an expected bit sequence to determine a correlation value for detecting a data packet. (Paragraph 0057.) The packet detector compares the received bit stream with the expected bit sequence after starting data extraction to determine a new correlation value. The sync-control module receives the correlation value from the packet detector, so that the sync-control module can control the data extraction unit for starting or restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value. (Paragraphs 0058-0059.) When this occurs, a data packet has been detected. (Paragraph 0057.) When the correlation value exceeds the threshold value, the correlation value is stored as the maximum correlation value for use as a new threshold value. (Paragraphs 0058 and 0059.)

<u>VI. Grounds of Rejection to be Reviewed on Appeal</u>

Claims 12-15, 18, and 22-25 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,768,729 (Ohsuge) in view of U.S. Patent No. 6,587,500 (Persson). Claims 16, 17, 19, and 26 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,768,729 (Ohsuge) in view of U.S. Patent No. 6,587,500 (Persson), further in view of U.S. Patent No. 5,619,542 (Gurney).

VII. Argument

A. Claims 12-17 and 22 are patentable because the combination of Ohsuge and Persson fails to even suggest every feature.

Ohsuge describes a CDMA rake[1] receiver. (Column 1-line 20-column 2, line 24.) The rake receiver utilizes multipath propagation of a radio frequency signal and synthesizes radio frequency signals received through the multiple propagation paths. Because of different propagation path lengths, a radio frequency signal originating from a transmitter is received at different delay times at the rake receiver. In order to identify the differently delayed radio frequency signals in a multipath environment, which delayed radio frequency signals originate from one radio frequency signal transmission, the so-called delay profile, i.e. the signal power distribution with respect to the delay times, is determined and analyzed. (Abstract; Column 4, lines 36-43.)

Ohsuge describes an approach, which allows an efficient implementation of the searching of a required number of correlation peaks from a delay profile. (Column 2, lines

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[1] A **rake receiver** is a radio receiver designed to counter the effects of multipath fading. It does this by using several "sub-receivers" each delayed slightly in order to tune in to the individual multipath components. Each component is decoded independently, but at a later stage combined in order to make the most use of the different transmission characteristics of each transmission path. This could very well result in higher signal-to-noise ratio (or Eb/N0) in a multipath environment than in a "clean" environment. The multipath channel through which a radio wave transmits wirelessly can be viewed as the original transmitted wave plus many delayed copies of the original transmitted wave, each with a different magnitude and time-of-arrival at the receiver. Since each multipath component also contains the original information, at the receiver, if the magnitude and time-of-arrival (phase) of each multipath component can be known (through a process called channel estimation), then all the multipath components can be added coherently to bring up the information reliability. The rake receiver is so named because of its analogous function to a garden rake, each finger collecting bit or symbol energy similarly to how tines on a rake collect leaves. (http://en.wikipedia.org/wiki/Rake receiver, January 29, 2008.)

34-53.) Rake reception section 7 (as shown in figs. 1, 8, 14, 16, and 18) is supplied with the required number of correlation peaks. A radio frequency signal is transmitted through a wireless multipath channel that can be viewed as the original transmitted wave plus many delayed copies of the original transmitted wave, each with a different magnitude and time-of-arrival at the receiver. Since each multipath component also contains the original information, at the receiver, if the magnitude and time-of-arrival (phase) of each multipath component can be known (through a process called channel estimation), then all the multipath components can be added coherently to bring up the information reliability. For this reason, correlation peaks are determined with respect to the delay times, where the time delay of each correlation peak corresponds to the aforementioned time-of-arrival. Referring to fig. 18 of Ohsuge, rake path allocation section 18 designates the detected paths to rake reception section 7. (Column 16, lines 1-13.)

According to Ohsuge, a valid data determination threshold is determined from an average power obtained by average power calculation of the delay profile and a predetermined threshold coefficient (constant). (Column 15, lines 14-55.) Data equal or larger than the valid data determination threshold are extracted from the delay profile. Then a predetermined number of correlation peaks is determined form the extracted data. Each of the correlation peaks has an amplitude and a position (with respect to the delay time, wherein each correlation peak represents a corresponding path. (Column. 15, lines 56-67.) The information about the detected paths is supplied to the rake reception section of the CDMA rake receiver of Ohsuge. (Column 16, lines 1-3.)

Persson relates to a time synchronization methodology applicable with hard decision receivers such as Bluetooth receivers. A correlator is used to determine the phase of symbols.

The preferred embodiment of Persson illustrates the time synchronization in terms of establishing and comparing four phase samplings. Timing synchronization is accomplished by oversampling the demodulator output four times, i.e., $f=1/T_s=4/T$, where f is the sampling frequency and T_s is the sampling time. Subsequently, the oversampled binary sequence is correlated with a known access code which precedes the actual data. Generally, the known access code is also a binary sequence. For hard decision type receivers, there is potentially more than one phase that results in maximum correlation. (Column 2, lines 7-25.)

The oversampled binary sequence is stored in a shift register. For each phase sample, the content of the shift register is shifted one step to the right. Thus, the shift register contains four sampling sequences of the received bit stream. An additional register contains the known sequence with which the four sampling sequences are correlated. A correlation value or correlator output is determined by the correlator for each sample and compared with a threshold value by means of a threshold comparator. The threshold comparator can be part of the correlator or a separate process or device. In a straight-forward implementation, the correlator output exceeds a predetermined threshold value, the timing is assumed to be correct and the phase of the sample values that caused the correlator trigger is used as a reference for the sampling time of the remaining part of the packet. (Column 2, lines 26-42; fig. 3.)

In the preferred embodiment of Persson, each channel symbol is sampled four times. Each of the generated sampling sequences is correlated with a reference sequence to generate a respective correlation value for each of the sampling sequences. (Fig. 6, step 206.) The respective correlation values are compared with the threshold value y to generate respective threshold comparator values or trigger output values x. (Fig. 6, step 208.) For the preferred

embodiment, the trigger output values X_k are binary values. The threshold value y_k can be updated prior to each successive comparison with a subsequent correlation value. More specifically, if a current correlation value s_k exceeds the threshold value y_k, the threshold value y_{k+1} is updated to the value of the current correlation value s_k, and the subsequent correlation value is compared to the updated threshold value y_{k+1}. Also, if a phase decision is made, the threshold value is set to a predefined value. Otherwise, the threshold value remains unchanged for the subsequent comparison. At step 210, a phase decision is made based on a trigger output state X_k. The trigger output state X_k is compared with a predetermined set of decision rules (cf. Fig. 5) to select a sampling phase that agrees with the trigger output state X_k and the determined set of decision rules. (Column 6, lines 32-61.)

The combination of Ohsuge and Persson fails to suggest the features of "starting data extraction from the bit stream when the correlation value exceeds a threshold value to indicate that a data packet has been detected" and "restarting data extraction from the bit stream when the new correlation value exceeds the stored maximum correlation value." An obviousness rejection under 35 U.S.C. § 103 is appropriate only when the differences between the claimed invention and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." *In re Dembiczak*, 175 F.3d 994, 50 U.S.P.Q.2d 1614, 1616 (Fed. Cir. 1999); 35 U.S.C. § 103(a) (1999). The ultimate determination of whether an invention would have been obvious is a legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) any objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 U.S.P.Q. 459, 467

(1966). An obviousness rejection must include some articulated reasoning that makes logical sense. *KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727,1741 (2007). ("To facilitate review, this analysis should be made explicit. See *In re Kahn,* 441 F.3d 977, 988 (C.A.Fed.2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness").").

The Office Action alleges that (Pages 5-6.):

> Regarding claim 12, Ohsuge et al. disclose a method comprising: comparing a bit stream derived from a received digital data stream with an expected bit sequence to determine a correlation value for detecting a data packet (3 in Fig.18; it is well known that a correlation value is generated by comparing an expected bit sequence with a received bit sequence; the A/D block 6 produce digital sequences); starting data extraction from the bit stream when the correlation value exceeds a threshold value to indicate that a data packet has been detected (7 in Fig.18; data extraction occurs after receiving peak value from element 18, wherein the peak value is determined from correlation values larger than the threshold value); and restarting data extraction from the bit stream when the new correlation value exceeds the stored maximum correlation value (data extraction occurs after receiving peak value from element 18, wherein the peak value is determined from correlation values larger than the new threshold value; rake reception section 7 in Fig. 18 is performed in predetermined cycles (Col 2, L6-1 I).).

While shown as a first embodiment but applicable to embodiments 2-6, Ohsuge discloses a rake receiver having DSP (Digital Signal Processor) 1 forming a path search section, delay profile measurement section 2, delay profile correlation value storage section 3 formed by a RAM (Random Access Memory) for temporarily storing delay profile data, antenna 4, RF reception circuit section 5, A/D (Analog/Digital) conversion section 6 for converting an analog signal into a digital signal, and Rake reception section 7 for performing in-phase synthesis of reception signals from a plurality of paths. (Column 3, line 59-column 4, line 3.) Ohsuge teaches a determination of several local maxima corresponding to a multipath

situation experienced at the position of the rake receiver of Ohsuge. Ohsuge is directed to configuring the rake receiver for multiple propagation paths that typically result from reflections in a wireless environment. The delay timing information relating to the local maxima is utilized to configure the several, independent rake receiver sections of Ohsuge. Each of the rake receiver sections operates in accordance with the respectively configured delay timing. Rake reception 7 is configured to identify propagation paths before rake reception section 7 processes the reception signals in order to extract data. Therefore, Ohsuge does not disclose the claimed feature of "restarting data extraction from the bit stream when the new correlation value exceeds the stored maximum correlation value" and "starting or restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value . . . ." Furthermore, Persson does not make up for the deficiencies in Ohsuge. Dependent claims 13-15 and 22, which ultimately depend from claim 12, is allowable for at least the same reason as the independent claim from which they ultimately depend.

Claims 12-15 and 22 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 12-15 and 22 under 35 U.S.C. 103(a) should be reversed.

B. Claims 12-15 and 22 are patentable because Persson fails to remedy the deficiencies of Ohsuge.

The combination of Ohsuge and Persson fails to suggest the features of "storing the correlation value that exceeds the threshold value as a maximum correlation value for use as a new threshold value" and "continuing comparing the bit stream with the expected bit sequence to determine a new correlation value." Regarding claim 12, the Office Action admits that (Page 6.):

> Ohsuge et al. disclose a valid data determination with a threshold section (83 in Fig. 18), but failed to teach storing the correlation value that exceeds a threshold value as a maximum correlation value for use as a new threshold value; and continuing comparing the received bit stream with the expected bit sequence to determine a new correlation value.

However, Persson is directed to a timing synchronization methodology and <u>not</u> to packet determination and data extraction from a bit stream. A corresponding component, called timing estimator 21, is described in the present application but operates differently to that described by Persson. (Paragraphs 0073-0077.) For example, as disclosed in the present specification, timing estimation compares the estimated timing of an expected edge with the actual edge timing. (Paragraph 0075.) In contrast, Persson determines the timing estimation from the correlation of different shifted sampling sequences. (Persson, column 2, lines 7-25.)

The claimed subject matter relates to the data packet determination and data extraction, which is upstream-connected to the timing estimator 21. For example, sample-and-hold module 22 performs downsampling by taking out the golden samples for symbol decision. (Paragraph 45.) Sample-and-hold module 22 also provides an interface to circuits to process extracted data on higher layers. Because Persson is not directed to data packet determination and extraction timing synchronization, a skilled person in the art would not refer to Persson as it does not teach or suggest Appellant's claimed features.

Claims 12-15 and 22 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 12-15 and 22 under 35 U.S.C. 103(a) should be reversed.

C. Claims 12-15 and 22 are patentable because the proposed modification of Persson to Ohsuge would render Ohsuge unsatisfactory for its intended purpose.

The modification of Persson to Ohsuge, as proposed by the Office Action, would render Ohsuge unsatisfactory for its intended purpose. Notwithstanding that the teaching of Persson relates to a receiver component, which is out of the scope of the teaching of Ohsuge and hence not described by Ohsuge, the Office Action's allegation that the threshold comparator and the method thereof can be combined with the CDMA rake receiver of Ohsuge should be assessed. The threshold comparator of Persson compares a threshold value with a variable threshold value. (Persson, column 4, lines 20-23.) If a current correlation value exceeds the threshold value, the threshold value is updated to the value of the current value. (Persson, column 4, lines 42-46.)

The Office Action alleges that the "teaching of updating the correlation value with threshold value as taught by Persson et al" would be implementable in the CDMA rake receiver of Ohsuge." (Page 3, last sentence.) The Office Action does not state precisely how such implementation should be put into practice. The Office Action's allegation might be understood in that instead of using the predetermined threshold coefficient (constant) of Ohsuge in the path search process (cf. col. 15, lines 22 to 55) of Ohsuge to obtain the final valid data determination threshold, the updating of the threshold on the basis of the delay profile data is obtained from the delay profile correlation value storage section (3) (cf. col. 15, lines 34 to 35 in conjunction with col. 4, lines 49-51) of Ohsuge. However, such a updating of the threshold as taught by Persson would obviously result only in the determination of the absolute maximum of the delay profile. The maximum value of the correlation data (i.e., the delay profile data) is used by Ohsuge to determine the threshold b.

(Ohsuge, column 15, lines 32-42.) Hence, the application of the updating process as taught by Persson would result in a redundant value, which is already determined and used in the teaching of Ohsuge. Moreover, the teaching of Ohsuge is intended to provide an optimal means for searching for a required number of correlation peaks from a delay profile. (Ohsuge, column 2, lines 29-31.) Hence, an implementation of the teaching of Persson in the CDMA receiver of Ohsuge would not result in a number of magnitudes and positions of the detected paths (corresponding to the requires number of correlation peaks from a delay profile (cf. col. 2, lines 29-31) (cf. col. 15, line 62-col. 16, line 3) but only in the magnitude and position of the detected path with the highest magnitude equal to the aforementioned absolute maximum of the delay profile data. In other words, combining Persson with Ohsuge results in a rake receiver processing only one propagation path and thus is incapable of processing multipath fading. Such an implementation of the updating of the threshold as taught by Persson in the CDMA rake receiver of Ohsuge results in an inoperable rake receiver, which does not operate as intended by Ohsuge[2].

Moreover, the threshold determination method described by Persson is used in a receiver, which oversamples the received analog radio frequency signals, for instance by a factor of 4. (Persson, column 2, lines 7-25.) Ohsuge is silent about whether the A/D conversion section 6 oversamples the received analog radio frequency signal. This means, the problem, which is discussed by Persson in that a phase timing synchronization is required when using oversampling of the received analog RF signal, is neither mentioned nor considered by Ohsuge because Ohsuge is silent about the specifics of the sampling of the

[2] In accordance with MPEP §2143.01(VI), "If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious."

received signal at the A/D conversion section 6. The combination of Ohsuge and Persson lacks any linking factor, and thus it is unclear how Persson would be combined with Ohsuge.

Claims 12-15 and 22 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 12-15 and 22 under 35 U.S.C. 103(a) should be reversed.

D. Claims 18 and 23 are patentable because the combination of Ohsuge and Persson fails to even suggest every feature.

Ohsuge describes a CDMA rake[3] receiver. (Column 1-line 20-column 2, line 24.) The rake receiver utilizes multipath propagation of a radio frequency signal and synthesizes radio frequency signals received through the multiple propagation paths. Because of different propagation path lengths, a radio frequency signal originating from a transmitter is received at different delay times at the rake receiver. In order to identify the differently delayed radio frequency signals in a multipath environment, which delayed radio frequency signals

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[3] A **rake receiver** is a radio receiver designed to counter the effects of multipath fading. It does this by using several "sub-receivers" each delayed slightly in order to tune in to the individual multipath components. Each component is decoded independently, but at a later stage combined in order to make the most use of the different transmission characteristics of each transmission path. This could very well result in higher signal-to-noise ratio (or Eb/N0) in a multipath environment than in a "clean" environment. The multipath channel through which a radio wave transmits wirelessly can be viewed as the original transmitted wave plus many delayed copies of the original transmitted wave, each with a different magnitude and time-of-arrival at the receiver. Since each multipath component also contains the original information, at the receiver, if the magnitude and time-of-arrival (phase) of each multipath component can be known (through a process called channel estimation), then all the multipath components can be added coherently to bring up the information reliability. The rake receiver is so named because of its analogous function to a garden rake, each finger collecting bit or symbol energy similarly to how tines on a rake collect leaves. (http://en.wikipedia.org/wiki/Rake receiver, January 29, 2008.)

originate from one radio frequency signal transmission, the so-called delay profile, i.e., the signal power distribution with respect to the delay times, is determined and analyzed. (Abstract; Column 4, lines 36-43.)

Ohsuge describes an approach, which allows an efficient implementation of the searching of a required number of correlation peaks from a delay profile. (Column 2, lines 34-53.) Rake reception section 7 (as shown in figs. 1, 8, 14, 16, and 18) is supplied with the required number of correlation peaks. A radio frequency signal is transmitted through a wireless multipath channel that can be viewed as the original transmitted wave plus many delayed copies of the original transmitted wave, each with a different magnitude and time-of-arrival at the receiver. Since each multipath component also contains the original information, at the receiver, if the magnitude and time-of-arrival (phase) of each multipath component can be known (through a process called channel estimation), then all the multipath components can be added coherently to bring up the information reliability. For this reason, correlation peaks are determined with respect to the delay times, where the time delay of each correlation peak corresponds to the aforementioned time-of-arrival. Referring to fig. 18 of Ohsuge, rake path allocation section 18 designates the detected paths to rake reception section 7. (Column 16, lines 1-13.)

According to Ohsuge, a valid data determination threshold is determined from an average power obtained by average power calculation of the delay profile and a predetermined threshold coefficient (constant). (Column 15, lines 14-55.) Data equal or larger than the valid data determination threshold are extracted from the delay profile. Then a predetermined number of correlation peaks is determined form the extracted data. Each of the correlation peaks has an amplitude and a position (with respect to the delay time, wherein

each correlation peak represents a corresponding path. (Column. 15, lines 56-67.) The information about the detected paths is supplied to the rake reception section of the CDMA rake receiver of Ohsuge. (Column 16, lines 1-3.)

Persson relates to a time synchronization methodology applicable with hard decision receivers such as Bluetooth receivers. A correlator is used to determine the phase of symbols. The preferred embodiment of Persson illustrates the time synchronization in terms of establishing and comparing four phase samplings. Timing synchronization is accomplished by oversampling the demodulator output four times, i.e., $f=1/T_s=4/T$, where f is the sampling frequency and T_s is the sampling time. Subsequently, the oversampled binary sequence is correlated with a known access code which precedes the actual data. Generally, the known access code is also a binary sequence. For hard decision type receivers, there is potentially more than one phase that results in maximum correlation. (Column 2, lines 7-25.)

The oversampled binary sequence is stored in a shift register. For each phase sample, the content of the shift register is shifted one step to the right. Thus, the shift register contains four sampling sequences of the received bit stream. An additional register contains the known sequence with which the four sampling sequences are correlated. A correlation value or correlator output is determined by the correlator for each sample and compared with a threshold value by means of a threshold comparator. The threshold comparator can be part of the correlator or a separate process or device. In a straight-forward implementation, the correlator output exceeds a predetermined threshold value, the timing is assumed to be correct and the phase of the sample values that caused the correlator trigger is used as a reference for the sampling time of the remaining part of the packet. (Column 2, lines 26-42; fig. 3.)

In the preferred embodiment of Persson, each channel symbol is sampled four times. Each of the generated sampling sequences is correlated with a reference sequence to generate a respective correlation value for each of the sampling sequences. (Fig. 6, step 206.) The respective correlation values are compared with the threshold value y to generate respective threshold comparator values or trigger output values x. (Fig. 6, step 208.) For the preferred embodiment, the trigger output values X_k are binary values. The threshold value y_k can be updated prior to each successive comparison with a subsequent correlation value. More specifically, if a current correlation value s_k exceeds the threshold value y_k, the threshold value y_{k+1} is updated to the value of the current correlation value s_k, and the subsequent correlation value is compared to the updated threshold value y_{k+1}. Also, if a phase decision is made, the threshold value is set to a predefined value. Otherwise, the threshold value remains unchanged for the subsequent comparison. At step 210, a phase decision is made based on a trigger output state X_k. The trigger output state X_k is compared with a predetermined set of decision rules (cf. Fig. 5) to select a sampling phase that agrees with the trigger output state X_k and the determined set of decision rules. (Column 6, lines 32-61.)

The combination of Ohsuge and Persson fails to suggest the features of "a sync-control module configured to receive the correlation value from the packet detector, the sync-control module controlling the data extraction unit for starting or restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value indicating that a data packet has been detected, and for storing the correlation value that exceeds the threshold value as maximum correlation value for use as a new threshold value." An obviousness rejection under 35 U.S.C. § 103 is appropriate only when the differences between the claimed invention and the prior art "are such that the

subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." *In re Dembiczak*, 175 F.3d 994, 50 U.S.P.Q.2d 1614, 1616 (Fed. Cir. 1999); 35 U.S.C. § 103(a) (1999). The ultimate determination of whether an invention would have been obvious is a legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) any objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 U.S.P.Q. 459, 467 (1966). An obviousness rejection must include some articulated reasoning that makes logical sense. *KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727,1741 (2007). ("To facilitate review, this analysis should be made explicit. See *In re Kahn,* 441 F.3d 977, 988 (C.A.Fed.2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness").").

Regarding claim 18, the Office Action alleges that (Page 8.):

> Ohsuge et al. disclose a sync-control module (8 in Fig. 18) for receiving the correlation value from the packet detector, the sync-control module controlling the data extraction unit for starting or restarting data extraction (7 in Fig. 18), but failed to teach storing the correlation value that exceeds a threshold value as a maximum correlation value for use as a new threshold value; and continuing comparing the received bit stream with the expected bit sequence to determine a new correlation value.

While shown as a first embodiment but applicable to embodiments 2-6, Ohsuge discloses a rake receiver having DSP (Digital Signal Processor) 1 forming a path search section, delay profile measurement section 2, delay profile correlation value storage section 3 formed by a RAM (Random Access Memory) for temporarily storing delay profile data, antenna 4, RF reception circuit section 5, A/D (Analog/Digital) conversion section 6 for converting an

analog signal into a digital signal, and Rake reception section 7 for performing in-phase synthesis of reception signals from a plurality of paths. (Column 3, line 59-column 4, line 3.) Ohsuge teaches a determination of several local maxima corresponding to a multipath situation experienced at the position of the rake receiver of Ohsuge. Ohsuge is direct to configuring the rake receiver for multiple propagation paths that typically result from reflections in a wireless environment. The delay timing information relating to the local maxima is utilized to configure the several, independent rake receiver sections of Ohsuge. Each of the rake receiver sections operates in accordance with the respectively configured delay timing. Rake reception 7 is configured to identify propagation paths before rake reception section 7 processes the reception signals in order to extracting data. Therefore, Ohsuge does not disclose the claimed feature of "restarting data extraction from the bit stream when the new correlation value exceeds the stored maximum correlation value" and "starting or restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value . . . ." Furthermore, Persson does not make up for the deficiencies in Ohsuge. Dependent claim 23, which ultimately depends from claim 18, is allowable for at least the same reason as the independent claim from which they ultimately depend.

Claims 18 and 23 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 18 and 23 under 35 U.S.C. 103(a) should be reversed.

E. Claims 18 and 23 are patentable because Persson fails to remedy the deficiencies of Ohsuge.

The combination of Ohsuge and Persson fails to suggest the feature of "storing the correlation value that exceeds the threshold value as a maximum correlation value for use as

a new threshold value." Regarding claim 18, the Office Action admits that (Page 8. Emphasis added.):

> **Ohsuge et al**. disclose a sync-control module (8 in Fig. 18) for receiving the correlation value from the packet detector, the sync-control module controlling the data extraction unit for starting or restarting data extraction (7 in Fig. 18), **but failed to teach storing the correlation value that exceeds a threshold value as a maximum correlation value for use as a new threshold value; and continuing comparing the received bit stream with the expected bit sequence to determine a new correlation value.**

However, Persson is directed to a timing synchronization methodology and not to packet determination and data extraction from a bit stream. As disclosed in the present specification, a corresponding component, called timing estimator 21, is also described in the present application but operates differently to that described by Persson. (Paragraphs 0073-0077.) For example, as disclosed in the present specification, timing estimation compares the estimated timing of an expected edge with the actual edge timing. (Paragraph 0075.) In contrast, Persson determines the timing estimation from the correlation of different shifted sampling sequences. (Persson, column 2, lines 7-25.)

The claimed subject matter relates to the data packet determination and data extraction, which is upstream-connected to the timing estimator 21. For example, sample-an-hold module performs downsampling by taking out the golden samples for symbol decision. (Paragraph 45.) Sample-and-hold module 22 also provides an interface to circuits to process extracted data on higher layers. Because Persson is not directed to data packet determination and extraction timing synchronization, a skilled person in the art would not refer to Persson as it does not teach or suggest Appellant's claimed features.

Claims 18 and 23 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 18 and 23 under 35 U.S.C. 103(a) should be reversed.

F. Claims 18 and 23 are patentable because the proposed modification of Persson to Ohsuge would render Ohsuge unsatisfactory for its intended purpose.

The modification of Persson to Ohsuge, as proposed by the Office Action, would render Ohsuge unsatisfactory for its intended purpose. Notwithstanding that the teaching of Persson relates to a receiver component, which is out of the scope of the teaching of Ohsuge and hence not described by Ohsuge, the Office Action's allegation that the threshold comparator and the method thereof can be combined with the CDMA rake receiver of Ohsuge should be firstly assessed. The threshold comparator of Persson compares a threshold value with a variable threshold value. (Persson, column 4, lines 20-23.) If a current correlation value exceeds the threshold value, the threshold value is updated to the value of the current value. (Persson, column 4, lines 42-46.)

The Office Action alleges that the "teaching of updating the correlation value with threshold value as taught by Persson et al" would be implementable in the CDMA rake receiver of Ohsuge." (Page 3, last sentence.) The Office Action does not state precisely how such implementation should be put into practice. The Office Action's allegation might be understood in that instead of using the predetermined threshold coefficient (constant) of Ohsuge in the path search process (cf. col. 15, lines 22 to 55) of Ohsuge to obtain the final valid data determination threshold, the updating of the threshold on the basis of the delay profile data obtained from the delay profile correlation value storage section (3) (cf. col. 15, lines 34 to 35 in conjunction with col. 4, lines 49-51) of Ohsuge. However, such a updating

of the threshold as taught by Persson would obviously result only in the determination of the absolute maximum of the delay profile. The maximum value of the correlation data (i.e. the delay profile data) is used by Ohsuge to determine the threshold b. (Ohsuge, column 15, lines 32-42.) Hence, the application of the updating process as taught by Persson would result in a redundant value, which is already determined and used in the teaching of Ohsuge. Moreover, the teaching of Ohsuge is intended to provide an optimal means for searching for a required number of correlation peaks from a delay profile. (Ohsuge, column 2, lines 29-31.) Hence, an implementation of the teaching of Persson in the CDMA receiver of Ohsuge would not result in a number of magnitudes and positions of the detected paths (corresponding to the requires number of correlation peaks from a delay profile (cf. col. 2, lines 29 to 31) (cf. col. 15, line 62 to col. 16, line 3) but only in the magnitude and position of the detected path with the highest magnitude equal to the aforementioned absolute maximum of the delay profile data. In other words, combining Persson with Ohsuge results in a rake receiver processing only one propagation path and thus is incapable of processing multipath fading. Such an implementation of the updating of the threshold as taught by Persson in the CDMA rake receiver of Ohsuge results in an inoperable rake receiver, which does not operate as intended by Ohsuge.

Moreover, the threshold determination method described by Persson is used in a receiver, which oversamples the received analog radio frequency signals, for instance by a factor of 4. (Persson, column 2, lines 7-25.) Ohsuge is silent about whether the A/D conversion section 6 oversamples the received analog radio frequency signal. This means, the problem, which is discussed by Persson in that a phase timing synchronization is required when using oversampling of the received analog RF signal, is neither mentioned nor

considered by Ohsuge because Ohsuge is silent about the specifics of the sampling of the received signal at the A/D conversion section 6. The combination of Ohsuge and Persson lacks any linking factor, and thus it is unclear how Persson would be combined with Ohsuge.

Claims 18 and 23 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 18 and 23 under 35 U.S.C. 103(a) should be reversed.

G. Claims 24 and 25 are patentable because the combination of Ohsuge and Persson fails to even suggest every feature.

Ohsuge describes a CDMA rake[4] receiver. (Column 1-line 20-column 2, line 24.) The rake receiver utilizes multipath propagation of a radio frequency signal and synthesizes radio frequency signals received through the multiple propagation paths. Because of different propagation path lengths, a radio frequency signal originating from a transmitter is received at different delay times at the rake receiver. In order to identify the differently delayed radio

[4] A **rake receiver** is a radio receiver designed to counter the effects of multipath fading. It does this by using several "sub-receivers" each delayed slightly in order to tune in to the individual multipath components. Each component is decoded independently, but at a later stage combined in order to make the most use of the different transmission characteristics of each transmission path. This could very well result in higher signal-to-noise ratio (or Eb/N0) in a multipath environment than in a "clean" environment. The multipath channel through which a radio wave transmits wirelessly can be viewed as the original transmitted wave plus many delayed copies of the original transmitted wave, each with a different magnitude and time-of-arrival at the receiver. Since each multipath component also contains the original information, at the receiver, if the magnitude and time-of-arrival (phase) of each multipath component can be known (through a process called channel estimation), then all the multipath components can be added coherently to bring up the information reliability. The rake receiver is so named because of its analogous function to a garden rake, each finger collecting bit or symbol energy similarly to how tines on a rake collect leaves. (http://en.wikipedia.org/wiki/Rake receiver, January 29, 2008.)

frequency signals in a multipath environment, which delayed radio frequency signals originate from one radio frequency signal transmission, the so-called delay profile, i.e. the signal power distribution with respect to the delay times, is determined and analyzed. (Abstract; Column 4, lines 36-43.)

Ohsuge describes an approach, which allows an efficient implementation of the searching of a required number of correlation peaks from a delay profile. (Column 2, lines 34-53.) Rake reception section 7 (as shown in figs. 1, 8, 14, 16, and 18) is supplied with the required number of correlation peaks. A radio frequency signal is transmitted through a wireless multipath channel that can be viewed as the original transmitted wave plus many delayed copies of the original transmitted wave, each with a different magnitude and time-of-arrival at the receiver. Since each multipath component also contains the original information, at the receiver, if the magnitude and time-of-arrival (phase) of each multipath component can be known (through a process called channel estimation), then all the multipath components can be added coherently to bring up the information reliability. For this reason, correlation peaks are determined with respect to the delay times, where the time delay of each correlation peak corresponds to the aforementioned time-of-arrival. Referring to fig. 18 of Ohsuge, rake path allocation section 18 designates the detected paths to rake reception section 7. (Column 16, lines 1-13.)

According to Ohsuge, a valid data determination threshold is determined from an average power obtained by average power calculation of the delay profile and a predetermined threshold coefficient (constant). (Column 15, lines 14-55.) Data equal or larger than the valid data determination threshold are extracted from the delay profile. Then a predetermined number of correlation peaks is determined form the extracted data. Each of the

correlation peaks has an amplitude and a position (with respect to the delay time, wherein each correlation peak represents a corresponding path. (Column. 15, lines 56-67.) The information about the detected paths is supplied to the rake reception section of the CDMA rake receiver of Ohsuge. (Column 16, lines 1-3.)

Persson relates to a time synchronization methodology applicable with hard decision receivers such as Bluetooth receivers. A correlator is used to determine the phase of symbols. The preferred embodiment of Persson illustrates the time synchronization in terms of establishing and comparing four phase samplings. Timing synchronization is accomplished by oversampling the demodulator output four times, i.e., $f=1/T_s=4/T$, where f is the sampling frequency and T_s is the sampling time. Subsequently, the oversampled binary sequence is correlated with a known access code which precedes the actual data. Generally, the known access code is also a binary sequence. For hard decision type receivers, there is potentially more than one phase that results in maximum correlation. (Column 2, lines 7-25.)

The oversampled binary sequence is stored in a shift register. For each phase sample, the content of the shift register is shifted one step to the right. Thus, the shift register contains four sampling sequences of the received bit stream. An additional register contains the known sequence with which the four sampling sequences are correlated. A correlation value or correlator output is determined by the correlator for each sample and compared with a threshold value by means of a threshold comparator. The threshold comparator can be part of the correlator or a separate process or device. In a straight-forward implementation, the correlator output exceeds a predetermined threshold value, the timing is assumed to be correct and the phase of the sample values that caused the correlator trigger is used as a

reference for the sampling time of the remaining part of the packet. (Column 2, lines 26-42; fig. 3.)

In the preferred embodiment of Persson, each channel symbol is sampled four times. Each of the generated sampling sequences is correlated with a reference sequence to generate a respective correlation value for each of the sampling sequences. (Fig. 6, step 206.) The respective correlation values are compared with the threshold value y to generate respective threshold comparator values or trigger output values x. (Fig. 6, step 208.) For the preferred embodiment, the trigger output values X_k are binary values. The threshold value y_k can be updated prior to each successive comparison with a subsequent correlation value. More specifically, if a current correlation value s_k exceeds the threshold value y_k, the threshold value y_{k+1} is updated to the value of the current correlation value s_k, and the subsequent correlation value is compared to the updated threshold value y_{k+1}. Also, if a phase decision is made, the threshold value is set to a predefined value. Otherwise, the threshold value remains unchanged for the subsequent comparison. At step 210, a phase decision is made based on a trigger output state X_k. The trigger output state X_k is compared with a predetermined set of decision rules (cf. Fig. 5) to select a sampling phase that agrees with the trigger output state X_k and the determined set of decision rules. (Column 6, lines 32-61.)

The combination of Ohsuge and Persson fails to suggest the features of "a sync-control module configured to receive the correlation value from the packet detector, the sync-control module controlling the data extraction unit for starting or restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value indicating that a data packet has been detected, and for storing the correlation value that exceeds the threshold value as maximum correlation value for use

as a new threshold value." An obviousness rejection under 35 U.S.C. § 103 is appropriate only when the differences between the claimed invention and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." *In re Dembiczak*, 175 F.3d 994, 50 U.S.P.Q.2d 1614, 1616 (Fed. Cir. 1999); 35 U.S.C. § 103(a) (1999). The ultimate determination of whether an invention would have been obvious is a legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) any objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 U.S.P.Q. 459, 467 (1966). An obviousness rejection must include some articulated reasoning that makes logical sense. *KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727,1741 (2007). ("To facilitate review, this analysis should be made explicit. See *In re Kahn,* 441 F.3d 977, 988 (C.A.Fed.2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness").").

Regarding claim 24, the Office Action alleges that (Page 8.):

> Ohsuge et al. disclose a sync-control module (8 in Fig. 18) for receiving the correlation value from the packet detector, the sync-control module controlling the data extraction unit for starting or restarting data extraction (7 in Fig. 18), but failed to teach storing the correlation value that exceeds a threshold value as a maximum correlation value for use as a new threshold value; and continuing comparing the received bit stream with the expected bit sequence to determine a new correlation value.

While shown as a first embodiment but applicable to embodiments 2-6, Ohsuge discloses a rake receiver having DSP (Digital Signal Processor) 1 forming a path search section, delay profile measurement section 2, delay profile correlation value storage section 3 formed by a

RAM (Random Access Memory) for temporarily storing delay profile data, antenna 4, RF reception circuit section 5, A/D (Analog/Digital) conversion section 6 for converting an analog signal into a digital signal, and Rake reception section 7 for performing in-phase synthesis of reception signals from a plurality of paths. (Column 3, line 59-column 4, line 3.) Ohsuge teaches a determination of several local maxima corresponding to a multipath situation experienced at the position of the rake receiver of Ohsuge. Ohsuge is direct to configuring the rake receiver for multiple propagation paths that typically result from reflections in a wireless environment. The delay timing information relating to the local maxima is utilized to configure the several, independent rake receiver sections of Ohsuge. Each of the rake receiver sections operates in accordance with the respectively configured delay timing. Rake reception 7 is configured to identify propagation paths before rake reception section 7 processes the reception signals in order to extracting data. Therefore, Ohsuge does not disclose the claimed feature of "restarting data extraction from the bit stream when the new correlation value exceeds the stored maximum correlation value" and "starting or restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value . . . ." Furthermore, Persson does not make up for the deficiencies in Ohsuge. Dependent claim 25, which depends from claim 24, is allowable for at least the same reason as the independent claim from which they ultimately depend.

Claims 24 and 25 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 24 and 25 under 35 U.S.C. 103(a) should be reversed.

H. Claims 24 and 25 are patentable because Persson fails to remedy the deficiencies of Ohsuge.

The combination of Ohsuge and Persson fails to suggest the feature of "storing the correlation value that exceeds the threshold value as a maximum correlation value for use as a new threshold value." Regarding claim 24, the Office Action admits that (Page 8. Emphasis added.):

> **Ohsuge** et al. disclose a sync-control module (8 in Fig. 18) for receiving the correlation value from the packet detector, the sync-control module controlling the data extraction unit for starting or restarting data extraction (7 in Fig. 18), **but failed to teach storing the correlation value that exceeds a threshold value as a maximum correlation value for use as a new threshold value; and continuing comparing the received bit stream with the expected bit sequence to determine a new correlation value.**

However, Persson is directed to a timing synchronization methodology and not to packet determination and data extraction from a bit stream. As disclosed in the present specification, a corresponding component, called timing estimator 21, is also described in the present application but operates differently to that described by Persson. (Paragraphs 0073-0077.) For example, as disclosed in the present specification, timing estimation compares the estimated timing of an expected edge with the actual edge timing. (Paragraph 0075.) In contrast, Persson determines the timing estimation from the correlation of different shifted sampling sequences. (Persson, column 2, lines 7-25.)

The claimed subject matter relates to the data packet determination and data extraction, which is upstream-connected to the timing estimator 21. For example, sample-an-hold module performs downsampling by taking out the golden samples for symbol decision. (Paragraph 45.) Sample-and-hold module 22 also provides an interface to circuits to process extracted data on higher layers. Because Persson is not directed to data packet determination

and extraction timing synchronization, a skilled person in the art would not refer to Persson as it does not teach or suggest Appellant's claimed features.

Claims 24 and 25 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 24 and 25 under 35 U.S.C. 103(a) should be reversed.

I. Claims 24 and 25 are patentable because the proposed modification of Persson to Ohsuge would render Ohsuge unsatisfactory for its intended purpose.

The modification of Persson to Ohsuge, as proposed by the Office Action, would render Ohsuge unsatisfactory for its intended purpose. Notwithstanding that the teaching of Persson relates to a receiver component, which is out of the scope of the teaching of Ohsuge and hence not described by Ohsuge, the Office Action's allegation that the threshold comparator and the method thereof can be combined with the CDMA rake receiver of Ohsuge should be firstly assessed. The threshold comparator of Persson compares a threshold value with a variable threshold value. (Persson, column 4, lines 20-23.) If a current correlation value exceeds the threshold value, the threshold value is updated to the value of the current value. (Persson, column 4, lines 42-46.)

The Office Action alleges that the "teaching of updating the correlation value with threshold value as taught by Persson et al" would be implementable in the CDMA rake receiver of Ohsuge." (Page 3, last sentence.) The Office Action does not state precisely how such implementation should be put into practice. The Office Action's allegation might be understood in that instead of using the predetermined threshold coefficient (constant) of Ohsuge in the path search process (cf. col. 15, lines 22 to 55) of Ohsuge to obtain the final valid data determination threshold, the updating of the threshold on the basis of the delay

profile data obtained from the delay profile correlation value storage section (3) (cf. col. 15, lines 34 to 35 in conjunction with col. 4, lines 49-51) of Ohsuge. However, such a updating of the threshold as taught by Persson would obviously result only in the determination of the absolute maximum of the delay profile. The maximum value of the correlation data (i.e. the delay profile data) is used by Ohsuge to determine the threshold b. (Ohsuge, column 15, lines 32-42.) Hence, the application of the updating process as taught by Persson would result in a redundant value, which is already determined and used in the teaching of Ohsuge. Moreover, the teaching of Ohsuge is intended to provide an optimal means for searching for a required number of correlation peaks from a delay profile. (Ohsuge, column 2, lines 29-31.) Hence, an implementation of the teaching of Persson in the CDMA receiver of Ohsuge would not result in a number of magnitudes and positions of the detected paths (corresponding to the requires number of correlation peaks from a delay profile (cf. col. 2, lines 29 -31) (cf. col. 15, line 62-col. 16, line 3) but only in the magnitude and position of the detected path with the highest magnitude equal to the aforementioned absolute maximum of the delay profile data. In other words, combining Persson with Ohsuge results in a rake receiver processing only one propagation path and thus is incapable of processing multipath fading. Such an implementation of the updating of the threshold as taught by Persson in the CDMA rake receiver of Ohsuge results in an inoperable rake receiver, which does not operate as intended by Ohsuge.

Moreover, the threshold determination method described by Persson is used in a receiver, which oversamples the received analog radio frequency signals, for instance by a factor of 4. (Persson, column 2, lines 7-25.) Ohsuge is silent about whether the A/D conversion section 6 oversamples the received analog radio frequency signal. This means, the

problem, which is discussed by Persson in that a phase timing synchronization is required when using oversampling of the received analog RF signal, is neither mentioned nor considered by Ohsuge because Ohsuge is silent about the specifics of the sampling of the received signal at the A/D conversion section 6. The combination of Ohsuge and Persson lacks any linking factor, and thus it is unclear how Persson would be combined with Ohsuge.

Claims 24 and 25 are patentable over Ohsuge in view Persson. Thus, the rejections of claims 24 and 25 under 35 U.S.C. 103(a) should be reversed.

J. Claim 15 is patentable because the combination of Ohsuge and Persson fails to even suggest every feature.

The combination of Ohsuge and Persson fails to suggest the feature of "wherein data extracted prior to restarting data extraction is rejected." Regarding claim 15, the Office Action alleges that (Page 7.):

> Persson et al. disclose wherein data extracted prior to restarting data extraction is rejected (since Persson teaches updating threshold value to reduce the probability of false alarm (Col 3, L21-25), it is obvious that the data extracted from the previous threshold (i.e., false alarm) should be rejected so as to improve quality. (official notice is taken here)).

Persson discloses the determination of optimum sampling timing (sampling phase) from a set of trigger output values (corresponding to a trigger output state X_k). (Column 3, line 59-column 4, line 5.) The trigger output values are determined from correlation values of each sampling stream with a predetermined bit sequence. The correlation values are fed into a threshold comparator that compares the correlation values with a variable threshold value to generate the trigger output values. The variable threshold is updated to the current correlation value sk if the current correlation value exceeds the current threshold. (Column 4, lines 32-52.) Persson further discloses a table of phase decision rules 90 in Fig. 5, in which a phase

decision is determined based on the trigger output state X_k. (Column 5, lines 9-31.) Persson fails to suggest the rejection of any extracted data. The Office Notice alleges that extracted data should be rejected from the previous threshold if the threshold value is updated in order to reduce the probability of a false alarm. However, the proposed modification to Persson would alter the intended purpose, in which trigger output states (corresponding to extracted data in the proposed modification) would be rejected when the threshold changes. The proposed modification would disrupt the phase decision process as taught by Persson.

Claim 15 is patentable over Ohsuge in view Persson. Thus, the rejection of claim 15 under 35 U.S.C. 103(a) should be reversed.

K. Claim 17 is patentable because the combination of Ohsuge, Persson, and Gurney fails to even suggest every feature.

Gurney describes methods and devices for predicating symbol timing estimation in a digital radio receiver. (Column 1, lines 42-44.) The methods are useful with time division multiplex division radio signals, where prior symbol timing information can be sued of the received signal in the desired time slot. (Column 1, lines 56-64.) The assumption is that the radio channel characteristics are slowly changing (quasi-static) over a short period of time. The received signal is typically sample at an integer multiple of the transmitted symbol rate. (Column 2, lines 3-5.) By allowing the symbol timing estimator to run prior to the desired time slot, the calculated symbol timing estimate may be stored and used at a later time. (Column 3, lines 2-6.)

The combination of Ohsuge, Persson, and Gurney fails to suggest the feature of "wherein timing of the sampling of bits is <u>continuously</u> tracked by comparing timing of symbols within an oversampled bitstream with actual timing of the sampling of bits and

correcting the timing of the sampling of bits if a deviation between the timing of the sampling of bits and the timing of the symbols exceeds a value." The Office Action alleges that (Pages 9-10.):

> Regarding claim 17, Ohsuge and Persson disclose all the subject matters above except for the specific teaching of timing of sampling is continuously tracked by comparing timing of symbols within an oversampled bit stream with actual timing of the sampling and correcting the timing of the sample if a deviation between the timing of the sampling and the timing of the symbols exceeds a value.
> Gurney et al, in the same field of endeavor, disclose an optimal sampling and timing estimation system, where oversampled data and optimal sampling phase are coupled with symbol timing decimator (as shown in Fig. 2). This provides highest possible signal to noise ratio in a digital receiver. Therefore, it is obvious to one of ordinary skill in art at the time of invention was mad to combine the efficient timing estimation system by Gurney et al with the CDMA receiver by Ohsuge et al. By doing so, provide optimal receiver, better reception signal quality, consume less power, and reduce production cost.

However Ohsuge discloses timing of a received signal <u>prior</u> to processing bits for a desired time slot. (Column 3, lines 2-10.)

Claim 17 is patentable over Ohsuge in view of Persson, further in view of Gurney. Thus, the rejection of claim 17 under 35 U.S.C. 103(a) should be reversed.

<u>L. Claim 16 is patentable because Gurney does remedy the deficiencies of the combination of Ohsuge and Persson.</u>

Claim 16 depends from independent claim 12. However, Gurney fails to remedy the deficiencies of Ohsuge and Persson. Gurney describes methods and devices for predicating symbol timing estimation in a digital radio receiver. (Column 1, lines 42-44.) The methods are useful with time division multiplex division radio signals, where prior symbol timing information can be sued of the received signal in the desired time slot. (Column 1, lines 56-64.) The assumption is that the radio channel characteristics are slowly changing (quasi-

static) over a short period of time. The received signal is typically sample at an integer multiple of the transmitted symbol rate. (Column 2, lines 3-5.) By allowing the symbol timing estimator to run prior to the desired time slot, the calculated symbol timing estimate may be stored and used at a later time. (Column 3, lines 2-6.) However, Gurney fails to suggest any of the features of claim 12.

Claim 16 is patentable over Ohsuge in view of Persson, further in view of Gurney. Thus, the rejection of claim 16 under 35 U.S.C. 103(a) should be reversed.

M. Claim 19 is patentable because Gurney does remedy the deficiencies of the combination of Ohsuge and Persson.

Claim 19 depends from independent claim 18. However, Gurney fails to remedy the deficiencies of Ohsuge and Persson. Gurney describes methods and devices for predicating symbol timing estimation in a digital radio receiver. (Column 1, lines 42-44.) The methods are useful with time division multiplex division radio signals, where prior symbol timing information can be sued of the received signal in the desired time slot. (Column 1, lines 56-64.) The assumption is that the radio channel characteristics are slowly changing (quasi-static) over a short period of time. The received signal is typically sample at an integer multiple of the transmitted symbol rate. (Column 2, lines 3-5.) By allowing the symbol timing estimator to run prior to the desired time slot, the calculated symbol timing estimate may be stored and used at a later time. (Column 3, lines 2-6.) However, Gurney fails to suggest any of the features of claim 18.

Claim 19 is patentable over Ohsuge in view of Persson, further in view of Gurney. Thus, the rejection of claim 19 under 35 U.S.C. 103(a) should be reversed.

<u>N. Claim 26 is patentable because Gurney does remedy the deficiencies of the combination of Ohsuge and Persson.</u>

Claim 26 depends from independent claim 24. However, Gurney fails to remedy the deficiencies of Ohsuge and Persson. Gurney describes methods and devices for predicating symbol timing estimation in a digital radio receiver. (Column 1, lines 42-44.) The methods are useful with time division multiplex division radio signals, where prior symbol timing information can be sued of the received signal in the desired time slot. (Column 1, lines 56-64.) The assumption is that the radio channel characteristics are slowly changing (quasi-static) over a short period of time. The received signal is typically sample at an integer multiple of the transmitted symbol rate. (Column 2, lines 3-5.) By allowing the symbol timing estimator to run prior to the desired time slot, the calculated symbol timing estimate may be stored and used at a later time. (Column 3, lines 2-6.) However, Gurney fails to suggest any of the features of claim 24.

Claim 26 is patentable over Ohsuge in view of Persson, further in view of Gurney. Thus, the rejection of claim 16 under 35 U.S.C. 103(a) should be reversed.

Conclusion

The rejections of claims 12-19 and 22-26 contained in the Final Office Action of November 14, 2007 should be reversed for at least the reasons recited above. Reversal of the rejections is requested.

Respectfully Submitted,

Banner & Witcoff, LTD

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By: Kenneth F. Smolik

Kenneth F. Smolik
Registration No. 44,344
Banner & Witcoff, Ltd.
10 South Wacker Drive
Suite 3000
Chicago, Illinois 60606
Telephone: 312-463-5000
Facsimile: 312-463-5001

CLAIMS APPENDIX

Claims 1-11 (Canceled).

12. A method comprising:

comparing a bit stream derived from a received digital data stream with an expected bit sequence to determine a correlation value for detecting a data packet;

starting data extraction from the bit stream when the correlation value exceeds a threshold value to indicate that a data packet has been detected;

storing the correlation value that exceeds the threshold value as a maximum correlation value for use as a new threshold value;

continuing comparing the bit stream with the expected bit sequence to determine a new correlation value; and

restarting data extraction from the bit stream when the new correlation value exceeds the stored maximum correlation value.

13. The method as claimed in claim 12, wherein the threshold value is a programmable value.

14. The method as claimed in claim 12, wherein the correlation value is stored as the maximum correlation value each time data extraction is started or restarted and the new correlation value continuously determined after starting or restarting data extraction is compared with the stored maximum correlation value.

15. The method as claimed in claim 12, wherein data extracted prior to restarting data extraction is rejected.

16. The method as claimed in claim 12, wherein after detecting a data packet an initial timing estimate is determined prior to starting data extraction that synchronizes sampling of bits from a data stream for data extraction with data stream symbols.

17. The method as claimed in claim 16, wherein timing of the sampling of bits is continuously tracked by comparing timing of symbols within an oversampled bitstream with actual timing of the sampling of bits and correcting the timing of the sampling of bits if a deviation between the timing of the sampling of bits and the timing of the symbols exceeds a value.

18. An apparatus comprising:

a data extraction unit configured to extract data from a received data stream;

a packet detector configured to compare a bit stream derived from a received digital data stream with an expected bit sequence to determine a correlation value for detecting a data packet, the packet detector comprising means for comparing the received bit stream with the expected bit sequence after starting data extraction to determine a new correlation value; and

a sync-control module configured to receive the correlation value from the packet detector, the sync-control module controlling the data extraction unit for starting or restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value indicating that a data packet has been detected, and for storing the correlation value that exceeds the threshold value as maximum correlation value for use as a new threshold value.

19. The apparatus as claimed in claim 18, wherein the device comprises an initial timing estimator which receives the digital data stream configured to determine an initial timing estimate prior to starting data extraction for synchronizing data extraction with data stream symbols, the initial timing estimate being output to the sync-control module.

20. The apparatus as claimed in claim 18, wherein the data extraction unit comprises a DC estimator configured to derive a DC estimate from the received data stream, a comparator configured to perform a bit decision on data of the received data stream to derive an oversampled bit stream, the comparator including first and second inputs configured to receive the DC estimate from the DC estimator and the data stream, respectively, and a sample-and-hold module configured to sample the oversampled bit stream received from the comparator.

21. The apparatus as claimed in claim 20, wherein the data extraction unit comprises a timing estimator configured to receive the oversampled bit stream output by the comparator for tracking the initial timing and for controlling the sample-and-hold module.

22. The method of claim 12 further comprising synchronizing the received bit stream based on the stored maximum correlation value.

23. The apparatus of claim 18 wherein the sync-control module further synchronizes the received data stream based on the stored maximum correlation value.

24. An apparatus comprising:

a data extraction unit configured to extract data from a received data stream;

a packet detector configured to compare a bit stream derived from a received digital data stream with an expected bit sequence to determine a correlation value for detecting a data packet, the packet detector further configured to compare the received bit stream with the expected bit sequence after starting data extraction to determine a new correlation value; and

a sync-control module configured to receive the correlation value from the packet detector, the sync-control module controlling the data extraction unit for starting or restarting data extraction from the bit stream when the correlation value exceeds a threshold value or a stored maximum correlation value indicating that a data packet has been detected, and for storing the correlation value that exceeds the threshold value as maximum correlation value for use as a new threshold value.

25. The apparatus of claim 24 wherein the sync-control module is further configured to synchronize the received data stream based on the stored maximum correlation value.

26. The apparatus as claimed in claim 24, wherein the device comprises an initial timing estimator which receives the digital data stream configured to determine an initial timing estimate prior to starting data extraction for synchronizing data extraction with data stream symbols, the initial timing estimate being output to the sync-control module.

27. The apparatus as claimed in claim 24, wherein the data extraction unit comprises a DC estimator configured to derive a DC estimate from the received data stream, a comparator configured to perform a bit decision on data of the received data stream to derive an oversampled bit stream, the comparator including first and second

inputs for receiving the DC estimate from the DC estimator and the data stream, respectively, and a sample-and-hold module configured to sample the oversampled bit stream received from the comparator.

28. The apparatus as claimed in claim 27, wherein the data extraction unit comprises a timing estimator configured to receive the oversampled bit stream output by the comparator for tracking the initial timing and for controlling the sample-and-hold module.

EVIDENCE APPENDIX

-NONE-

RELATED PROCEEDINGS APPENDIX

-NONE-